

Induced abortion operations and their early sequelae

JOINT STUDY OF THE ROYAL COLLEGE OF GENERAL PRACTITIONERS AND THE ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

SUMMARY. *In a group of 6105 women undergoing induced abortion, morbidity related to the operation occurred in 10 per cent of women, but in only two per cent was this considered to be major. The main factors which independently affected morbidity were the place of operation, gestation at termination, method of operation, sterilization at the time of abortion, and smoking habits. Morbidity rates were higher in association with operations carried out under the National Health Service than in private practice. Possible means of reducing early morbidity are discussed.*

Introduction

DURING the decade following the Abortion Act of 1967 the number of legal abortions carried out in England and Wales rose from 83 851 in 1970 to 163 126 in 1980. The importance of assessing the sequelae of the operation and the many variables which may affect these has been stressed by numerous authors, but a number of factors have made studies so far reported difficult to compare and interpret. Many studies dealing with early complications have looked only at the immediate post-operative period, usually the first 24 hours, and because the operator has rarely been able to follow up patients routinely for longer periods, problems in the weeks following hospital discharge have often been omitted. Official figures from notification forms completed by the gynaecologist are in any case accepted to be underestimates as details have to be completed within seven days of the operation. Further, the International Classification of Diseases, although adequately identifying many types of complications associated with induced abortion, sets out no standards for recording or evaluating their severity.¹ Thus, the literature contains a spectrum of definitions for various sequelae; for example, haemorrhage has been defined according to the quantity of blood loss, varying between 100 and 1000 ml,² according to the need for blood transfusion,³ or according to the number of days of post-termination haemorrhage.⁴ Infection has been defined according to the level of body temperature, the nature of the infective organisms,³ or the number of days of post-operative fever.⁴ Changing methods, varying attitudes and differences in the legal status of the operation between centres reporting on the effects of the operation, further contribute to the difficulty in comparing and correlating the related complications. The relatively low rate of complications of the operation and the large number of factors which may contribute to these makes statistical evaluation complex,

Principal authors: P.I. Frank, MD, FRCGP, C.R. Kay, CBE, MD, PhD, FRCGP, and S.J. Wingrave, BA, MIBiol; RCGP Manchester Research Unit. T.L.T. Lewis, CBE, MB, FRCS, FRCOG, Emeritus Consultant, Guy's Hospital and Queen Charlotte's Hospital for Women, London. J. Osborne, BSc, PhD, and C. Newell, MA, MSc; Department of Medical Demography, London School of Hygiene and Tropical Medicine.

© *Journal of the Royal College of General Practitioners*, 1985, 35, 175-180.

and large numbers may be needed in order to obtain reliable results.

This collaborative study between the Royal College of General Practitioners and the Royal College of Obstetricians and Gynaecologists aims to compare the subsequent health of a group of women having an induced abortion with a control group presenting to the same doctors with an unplanned pregnancy not terminated by induced abortion. In the present paper details of the operation and early sequelae are examined in 6105 women having an induced abortion.

Method

Detailed accounts of methodology, the characteristics of recruited women, and the outcome of pregnancy following the induced abortion operation have been described elsewhere.^{5,6} In summary, 1509 general practitioners from England, Scotland and Wales recruited patients, and 795 gynaecologists to whom patients were referred for induced abortion contributed relevant information concerning details of consultation and, if performed, the operation and early complications. Recruitment commenced in October 1976 and ended in July 1979.

General practitioners completed recruitment forms for all women who they referred for induced abortion and for all controls. Details of the operation and early complications were given by the gynaecologists. Details of the outcome of the pregnancies of women in the control group were supplied by the general practitioner. Every six months, for all women referred for induced abortion and controls, the general practitioners have achieved continuing observation by the completion of follow-up forms. In the course of follow-up, information is being collected about all newly presenting episodes of morbidity, and newly occurring pregnancies reported within the previous six months. In this way the complications of induced abortion recorded in the study have included not only the early complications usually encountered by the operator, but also morbidity seen by the general practitioner during the first 21 days following the operation.

Early complications were defined as those occurring within 21 days of termination of pregnancy and were divided into the following categories:

1. All morbidity newly presenting to the gynaecologist or general practitioner.
2. All morbidity attributable to the induced abortion. This was sub-divided into:
 - a) Haemorrhage
All reported haemorrhage
Haemorrhage reported to be in excess of 500 ml
Haemorrhage requiring blood transfusion or evacuation of retained products
 - b) Operative injury
All injury
Cervical laceration
Uterine perforation
 - c) Post-operative infection
Pelvic inflammatory disease, salpingitis, intrauterine infection
Vulvitis and vaginitis
Wound infection
Pyrexia of unknown origin
Urinary tract infection

- d) Thromboembolic disease
 - Pulmonary infarction
 - Deep vein thrombosis of legs
 - Thrombophlebitis of legs
 - Thrombophlebitis of arms at the site of transfusion or injection associated with induced abortion
- e) Psychiatric morbidity
 - Psychoses
 - Neuroses
- 3. Major complications
 - a) Death
 - b) Haemorrhage of 500 ml or over or requiring blood transfusion
 - c) Uterine perforation
 - d) Complication necessitating laparotomy
 - e) Salpingitis
 - f) Pulmonary embolism
 - g) Cerebrovascular morbidity
 - h) Deep vein thrombosis of legs
 - i) Psychoses

Analysis of results

A number of potential predisposing factors in these complications of abortion have been studied (Table 1). Some of these factors taken alone may be significantly associated with complications. However, there are difficulties in analysing so many factors as it is to be expected that some results will appear statistically significant even if the null hypothesis were true.

As many of these factors are interrelated (for example, women of high gravidity will tend to be older than women of low gravidity), it is necessary to consider the effects of the variables simultaneously rather than individually. This was achieved by the use of multiple logistic regression of the incidence rates on selected variables. Not all variables at all levels could be included in this analysis because the number of these combinations is large compared with the number of available cases in each morbidity group. The choice of variables included in this analysis has taken account of an examination of each variable individually (using the variables in Table 1) and of biological

Table 1. Factors considered in studying early sequelae of induced abortion.

Age	Other previous illness
Educational status	Gestation
Smoking habits	Method of operation
Marital status	Place of operation
Gravidity	Dilator size
Previous induced abortion	Length of hospital stay
Previous gynaecological illness	Status of operator
Previous mental illness	Sterilization at termination
Previous psychiatric disorder	

plausibility. The variables used were age, smoking, gestation (last menstrual period to date of termination), method of abortion, place of operation, sterilization at termination of pregnancy and, in the case of psychiatric sequelae, previous psychiatric illness. In this way the effect of each of these variables on the early sequelae of induced abortion were simultaneously controlled and could be studied independently.

The results of the logistic regression analyses are shown in the form of estimated relative risks together with their 95 per cent confidence limits. However, even though the number of abortions studied was large (6105), the numbers of patients experiencing specific sequelae may be small, and for this reason the significance levels and confidence intervals should be interpreted with caution.

Results

Of the 6105 operations in this analysis, 72 per cent were performed on National Health Service premises, the remainder privately. Characteristics of the patients in this study have been discussed in a previous paper.⁵ The study population compared well with Office of Population Censuses and Surveys (OPCS) figures⁷ for age, parity and marital status. Comparison of patients having their operation on private or National Health Service (NHS) premises showed the private sector to contain a higher proportion of single nulliparous women (Table 2). They tended to be from a higher educational class and were less likely to smoke (Table 3). These important differences have been taken into account when analysing the sequelae of the operation.

Table 2. Characteristics of patients undergoing induced abortion: age, marital status and parity. (Figures in parentheses are for 1977 for women resident in England and Wales.)⁷

	Place of operation			
	NHS (%)		Private (%)	
Age (years)				
Under 16	2.5	(5.1)	1.4	(2.0)
16-19	24.9	(22.9)	27.2	(25.9)
20-34	53.8	(54.2)	53.3	(59.8)
35 and over	18.8	(17.8)	18.1	(12.3)
Total	100.0	(100.0)	100.0	(100.0)
	n = 4422	(n = 51591)	n = 1683	(n = 49431)
Marital status				
Married	41.8	(45.7)	37.0	(31.6)
Single	45.3	(43.3)	52.3	(58.5)
Other	12.9	(11.0)	10.7	(9.9)
Total	100.0	(100.0)	100.0	(100.0)
	n = 4422	(n = 52167)	n = 1683	(n = 49905)
Parity				
Nil	41.6		52.1	
1-2	32.2		29.0	
3 or more	26.2		18.9	
Total	100.0		100.0	
	n = 4422		n = 1683	

n = number of women.

Table 3. Characteristics of patients undergoing induced abortion: educational status and smoking at recruitment.

	Place of operation	
	NHS (%) (n = 4422)	Private (%) (n = 1683)
Age of finishing full-time education		
Under 17 years	69.6	65.2
17 and over	17.8	23.9
Unfinished	12.2	10.2
Not known	0.4	0.7
Total	100.0	100.0
Cigarettes per day		
Nil	53.0	59.9
1-9	28.1	23.6
20 and over	18.1	15.3
Not known	0.8	1.2
Total	100.0	100.0

n = number of women.

Operation details

Gestation. Almost a quarter of patients had their termination before nine weeks of gestation and 85 per cent in the first trimester; 36 per cent of private operations were performed before nine weeks compared with 20 per cent in the NHS series. The distribution of gestation times was similar to OPCS figures,⁷ the small variations which were apparent being due to differences between private and NHS sector operations, and the excess of the latter in this study.

Method of termination. Suction evacuation was the method used in 82.8 per cent of operations. In private premises 89.0 per cent of operations were carried out by suction evacuation compared with 80.6 per cent in the NHS sector. This difference was mostly due to differences in the technique employed for operations carried out between 13 and 16 weeks of gestation (Table 4). In the NHS sector uterine instillation was the procedure used for

Table 4. Method of termination in women of 13 to 16 weeks gestation at time of operation.

Method	Place of operation		
	NHS (%) (n = 565)	Private (%) (n = 147)	Total (%) (n = 712)
Suction evacuation	26.2	74.1	36.1
D and C with forceps evacuation	8.0	15.0	9.4
Uterine instillation procedure	56.3	10.2	46.8
Hysterotomy	6.4	0.7	5.2
Hysterectomy	1.2	0.0	1.0
Other	2.0	0.0	1.5
Total	100.0	100.0	100.0

56.3 per cent of women (98 per cent of these using prostaglandins) compared with only 10.2 per cent in the private sector. Hysterotomy was the method of operation in women of 13 to 16 weeks of gestation in 6.4 per cent of NHS terminations, compared with 0.7 per cent in the private sector. Suction evacuation was used in almost three-quarters of private patients between 13 to 16 weeks gestation and dilatation and curettage with forceps evacuation in 15.0 per cent, compared with NHS figures of 26.2 per cent and 8.0 per cent respectively.

The total figures from this study were similar to national figures, the small differences which were present being due to the excess of women having the operation on NHS premises in the present study. Local anaesthetic was used in only 3.8 per cent of suction evacuation procedures.

Waiting time for operation. In the NHS sector 27 per cent of women had to wait at least three weeks from first consulting their general practitioner to their operation, compared with 14 per cent having their operation on private premises. When examining data for patients whose gestation was 13 to 16 weeks at termination, 47 per cent of NHS compared with 25 per cent of private terminations waited three weeks or more (Table 5). The waiting time was next divided into two segments — time elapsed from recruitment to consultation with the gynaecologist and from consultation with the gynaecologist to operation (Table 6). Consideration of all patients regardless of gestation indicated that the delay in the NHS compared with the private sector was in the wait for a gynaecologist appointment, rather than waiting for the actual operation. However, when examining data only for procedures carried out at 13 to 16 weeks gestation, the increased delay in the NHS terminations appeared to be more in the interval between the gynaecologist consultation and the operation.

Table 5. Gestation at operation for women waiting 21 days or more from first consultation with the general practitioner to operation.

Gestation at operation (weeks)	Place of operation	
	NHS (%)	Private (%)
Less than 13	24 (n = 3790)	12 (n = 1476)
13–16	47 (n = 565)	25 (n = 147)
17 or more	44 (n = 117)	30 (n = 60)
Total	27 (n = 4422)	14 (n = 1683)

n = number of women.

Table 6. Median waiting time for consultation with the gynaecologist and for the operation.

	Number of women		Waiting time from GP to gynaecologist (days)		Waiting time from gynaecologist to operation (days)	
	NHS	Private	NHS	Private	NHS	Private
All patients	4422	1683	7	5	6	6
Patients 13–16 weeks gestation at operation	565	147	8	6	8	5

Table 7. Length of hospital stay.

Number of days in hospital	Place of operation	
	NHS (%) n = 4420 ^a	Private (%) n = 1683
Outpatient	8.5	29.9
1–2	54.8	68.7
3 or more	36.7	1.4
Total	100.0	100.0
Mean length of hospital stay	2.6 days	1.0 days

^aIn two patients length of hospital stay was unknown.

Length of hospital stay. The mean length of hospital stay was 2.6 days for NHS terminations and 1.0 days in the private sector (Table 7). The operation was carried out as an outpatient procedure in 29.9 per cent of private sector terminations compared with 8.5 per cent of NHS operations. A large excess of patients having NHS terminations stayed three days or more (36.7 per cent) compared with those in private premises (1.4 per cent).

Sterilization at termination of pregnancy. Sterilization was performed in 15 per cent of NHS procedures and 5 per cent of those in the private sector.

Morbidity encountered in the first 21 days

No deaths occurred in the first 21 days after induced abortion in this group of women.

Newly presenting morbidity was reported in 1031 patients (16.9 per cent) in the 21 days following induced abortion. Of these a total of 612 patients (10.0 per cent) had morbidity thought to be directly related to the termination. Major complications, as defined earlier, were encountered in 127 patients (2.1 per cent). It could be argued, however, that haemorrhage of 500 ml is not necessarily a major complication, since many blood donors routinely give this amount without health problems. When only the requirement for a blood transfusion was used to define major blood loss, the major morbidity rate was reduced to 0.8 per cent.

Women who had sterilization as a concurrent procedure had 43 per cent increased relative risk of morbidity (Table 8). Those having their termination on private premises had 42 per cent less risk than NHS patients. Smokers had a 25 per cent increased risk over non-smokers. These differences were all significant ($P < 0.05$).

When examining data confined to women of 13 to 16 weeks gestation, the place of operation assumed even greater importance; operations carried out in private premises had only 30 per cent of the risk of related morbidity compared with those completed in the NHS (95 per cent confidence limits 0.15–0.59).

It was not possible to evaluate the benefits of using local as opposed to general anaesthetic for suction procedures as only 178 patients (3.8 per cent) had local anaesthetic, and the number proved insufficient for meaningful analysis.

Haemorrhage. Haemorrhage was reported in a total of 243 patients (4.0 per cent). Blood loss greater than 500 ml was reported in 79 patients (1.3 per cent) (Table 8). A loss requiring blood transfusion or further evacuation occurred in 122 patients (2.0 per cent). The significant factors independently affecting the incidence of a haemorrhage of greater than 500 ml were period of gestation, place of operation and smoking. Operations performed at over 12 weeks of gestation carried an estimated sevenfold increased risk of haemorrhage and those performed on NHS premises carried more than four times the risk of private procedures. Smokers had a 62 per cent increase in risk compared with non-smokers.

Infection. Infection was reported in 218 patients (3.6 per cent) (Table 8). Of these, 100 women had pelvic inflammatory disease, 44 vaginal or vulval infection, and 12 wound infection. In 28 patients pyrexia of unknown origin was the only diagnosis. Urinary tract infection was encountered in 48 patients. Several women had more than one site of infection. The factors significantly related to increased rate of infection were: method of operation (instillation procedures carrying a twofold increase in relative risk over a suction evacuation technique), sterilization at the time of operation (72 per cent increased risk) and smoking (34 per cent increased risk).

Operative trauma. Trauma was reported in 37 patients (0.6 per cent) (Table 8). The injury was perforation of the uterus in 22 women and cervical lacerations in 11 women. Four patients had complications due to anaesthesia. Six patients required laparotomy to repair perforation, and one patient who sustained a ruptured uterus had a hysterectomy. The most important factor affecting the occurrence of trauma appeared to be the place of operation. Patients undergoing induced abortion on private premises had only one-third of the risk of injury compared with those going to the NHS sector.

Thromboembolic disorders. Thromboembolic complications were encountered in 29 patients (0.5 per cent) (Table 8). Of these, three women had pulmonary infarction, two had deep vein thrombosis of the legs, 13 had superficial thrombophlebitis of the legs, and 10 had thrombophlebitis of the arms at the site of injection or transfusion associated with termination. The only variable which appeared to have a significant effect on this complication was age. In women aged over 35 years the relative risk of thromboembolic disease was 2.77 times that of women under this age.

Psychiatric morbidity. Psychiatric morbidity (Table 8) following termination of pregnancy was reported in 140 patients (2.4 per cent). Of these, two required hospital admission with schizophrenic illness. The remainder had a variety of neurotic states ranging from neurotic depression and anxiety state to insomnia. Patients with a previous history of depression had a 2.59 times increased risk of post-operative depression compared with those who had no such history.

Discussion

Annual statistics on abortion published by OPCS⁷ carry the minimum of comment, and complications are recorded only to within one week of operation and usually only prior to discharge from hospital, thereby underestimating the complication rates. The present survey, which has collected data from general practitioners as well as gynaecologists, does not suffer from this limitation.

The characteristics of the patients correspond well to national statistics. Variations which do exist appear to be due to the higher proportion of women having terminations within the National Health Service (NHS) in the present study, as patients bypassing their general practitioners and going directly to the private sector were not recruited.

Details of the operation were similar to national statistics:⁷ important differences between private and NHS terminations were shown in the higher proportion of early operations in the former and in the choice of method, particularly in early mid-trimester operations. Thus, for terminations of 13 weeks and over, uterine instillation of prostaglandin was the commonest method used in the NHS, while suction, with or without forceps evacuation, was most frequently used in private practice.

Delay between the first consultation with the general practitioner and the operation was longer in the NHS than in the private sector, particularly in those women having the operation after 13 weeks of gestation. A number of factors could contribute to this difference in waiting time. Pressure on NHS resources is likely to create administrative delays and to cause a reduction in the availability of outpatient departments and operating time. Some of the lengthened waiting period between consultation with the gynaecologist and the operation in the NHS sector is, however, deliberate policy, when uterine instillation procedures are to be used. These variations between the NHS and private sectors confirm the findings of the recent study by the Royal College of Obstetricians and Gynaecologists concerning late abortions.⁸ Delay has been cited as a major factor in the incidence of complications following induced abortion,⁹ and in the present study increasing gestation was an important contributory factor, particularly in the incidence of haemorrhage. Almost half the women having an NHS termination who were between 13 and 16 weeks of gestation at operation had waited at least three weeks since seeing their general practitioner, compared with only 25 per cent in the private sector. If increasing gestation adds to the hazards of the operation, these women could have been placed at increased risk by the delay.

Differences between the NHS and private sector in the method of abortion and the increased proportion of sterilization procedures done at the time of abortion contributed to the long hospital stay in the NHS sector, which was over two and a half times that of the private sector. The difference was most marked for patients staying three days or more (1.4 per cent of private terminations compared with 36.7 per cent of those having their operations in the NHS). Corresponding national statistics⁷ are considerably lower (0.48 per cent private and 20.3 per cent NHS terminations) but show similar wide differences. It is, therefore, of great importance that careful consideration should be given to the financial and psychosocial implications involved in prolonging the hospital stay of women undergoing induced abortion.

No deaths occurred within three weeks of the operation in the present study, but some morbidity was reported in 16.9 per cent of all women. In two other large-scale studies reported in a major review by Tietze,¹⁰ the overall morbidity was 14.9 per cent in women who were followed up. These two studies included minor complaints as well as medical diagnoses, and it was concluded that this could produce an exaggerated impression of the

Table 8. Independent effect of specific variables on morbidity of 6105 women undergoing induced abortion.

Variable	Population	All related morbidity			Haemorrhage > 500 ml			Infection			Operative trauma			Thromboembolic disease			Psychiatric morbidity		
		Obs. no.	Adjusted no. rel. risk (95% CL)	Rate 10.0%	Obs. no.	Adjusted no. rel. risk (95% CL)	Rate 1.3%	Obs. no.	Adjusted no. rel. risk (95% CL)	Rate 3.6%	Obs. no.	Adjusted no. rel. risk (95% CL)	Rate 0.6%	Obs. no.	Adjusted no. rel. risk (95% CL)	Rate 0.5%	Obs. no.	Adjusted no. rel. risk (95% CL)	Rate 2.4%
Age																			
Under 35	5053	512	1.00		66	1.00		187	1.00		33	1.00		17	1.00		113	1.00	
Over 35	1052	100	0.85 (0.68-1.07)		13	0.95 (0.50-1.78)		31	0.69 (0.47-1.02)		4	0.47 (0.17-1.35)		12	2.77* (1.25-6.14)		29	1.09 (0.71-1.67)	
Smoking																			
Nil	3353	295	1.00		32	1.00		102	1.00		19	1.00		15	1.00				
Some	2752	317	1.25* (1.10-1.47)		47	1.62* (1.04-2.53)		116	1.34* (0.04-1.74)		18	1.07 (0.57-2.02)		14	1.19 (0.59-2.41)				
Method																			
Suction	5059	469	1.00		51	1.00		165	1.00		28	1.00		24	1.00		112	1.00	
Uterine instillation	542	80	1.27 (0.90-1.78)		16	1.54 (0.67-3.50)		31	2.15* (1.22-8.77)		5	1.08 (0.28-4.10)		4	1.75 (0.37-8.38)		18	1.44 (0.70-2.95)	
Other	504	63	1.20 (0.91-1.58)		12	1.88 (0.95-3.73)		22	1.34 (0.85-2.11)		4	1.17 (0.39-3.54)		1	0.34 (0.06-1.99)		12	0.95 (0.51-2.77)	
Place of operation																			
NHS	4422	511	1.00		74	1.00		174	1.00		33	1.00		24	1.00		112	1.00	
Private	1683	101	0.58* (0.46-0.72)		5	0.24* (0.10-0.55)		44	0.75 (0.54-1.05)		4	0.35* (0.13-0.92)		5	0.67 (0.26-1.69)		30	0.85 (0.56-1.29)	
Sterilization																			
No	5350	507	1.00		67	1.00		179	1.00		30	1.00		20	1.00		118	1.00	
Yes	755	105	1.43* (1.14-1.80)		12	1.07 (0.55-2.08)		39	1.72* (1.19-2.49)		7	1.82 (0.73-4.36)		9	2.13 (0.89-5.10)		24	1.22 (0.76-1.97)	
Gestation																			
Under 9 weeks	1497	117	1.00		3	1.00		53	1.00		8	1.00		6	1.00		26	1.00	
9-12 weeks	3719	374	1.17 (0.95-1.44)		52	5.60* (2.04-15.41)		127	0.90 (0.66-1.23)		21	0.91 (0.41-2.03)		8	1.08 (0.44-2.64)		90	1.33 (0.86-2.06)	
Over 12 weeks	889	121	1.36 (0.98-1.88)		24	7.73* (2.41-24.87)		38	0.70 (0.40-1.21)		8	1.37 (0.40-4.74)		15	1.07 (0.23-4.99)		26	1.38 (0.69-2.76)	
Previous mental illness																			
Nil	4598																76	1.00	
Some	1507																66	2.59* (1.86-3.61)	

Obs. no. = observed number.

Adjusted rel. risk = Relative risk for each variable to show its independent effect after adjustment by multiple logistic regression for all the other variables examined.

95% CL = 95 per cent confidence limits.

* $P < 0.05$.

risks of the operation. A similar view has been taken in the present study, and only morbidity thought to be directly related to the operation has been analysed in detail. This was reported in 10.0 per cent of all patients, compared with a figure of 6.9 per cent from a large study in Hawaii.¹¹ A likely reason for the increased reported rate of morbidity in the present observation is that a more comprehensive follow-up was possible with the use of general practitioner records.

The major complication rate of 2.1 per cent was similar to the results from Hawaii¹¹ where similar criteria were used. When only the requirement of blood transfusion was used to define major blood loss, the major morbidity rate was reduced to 0.8 per cent, which corresponds closely to figures of 0.7 per cent from two large studies from the USA.²

Although increasing gestation appeared to be a factor in increasing the overall morbidity rate, the increase was not statistically significant and did not approach the magnitude found in other studies,⁹ where complication rates for second trimester abortion were four to five times greater than those carried out in the first 12 weeks. Gestation assumed much greater importance when examining haemorrhage, where women of nine to 12 weeks gestation had a fivefold increased relative risk compared with those of less than nine weeks gestation, and those of over 12 weeks gestation had a sevenfold increased relative risk; both of these results are statistically significant. There is no evidence from the present study, however, that uterine instillation procedures have a definite advantage over suction evacuation procedures in respect of morbidity encountered within the first three weeks. Instillation methods may mean an unpleasant experience for the patient, a prolonged hospital stay and higher costs. On the other hand, they can be performed by less experienced junior staff and are often more acceptable to nursing and medical personnel than the more difficult and sometimes destructive suction and forceps evacuation procedures. The finding that smoking was associated with significantly increased morbidity, in particular haemorrhage and infection, is of interest and requires further evaluation.

Sterilization at the time of operation also significantly increased morbidity, but the relative risk did not appear to be as high as some American estimates.¹² However, it is not known whether abortion followed by sterilization at a later date is safer than when the two operations are combined,¹³ although one small study¹⁴ failed to detect a difference between the two procedures.

Blood loss of 500 ml or more was encountered in 1.3 per cent of patients, which is similar to the results of a large American study of 1975.² The figure of 4.0 per cent for any reported haemorrhage is difficult to compare with other work, but lies between the 2.5 per cent in Singapore and 8.5 per cent in Yugoslavia reported in a World Health Organization study,¹⁵ which included all 'excessive loss' of blood. Increasing gestation appeared to be the main factor affecting blood loss. Unlike other studies,² the method of abortion used did not have a definite effect. The rate of infection, however, was significantly increased by 50 per cent in patients having a uterine instillation procedure, and this rate was similar to those observed in studies from Norway¹⁶ and Hawaii,¹¹ although lower than in previously published studies.¹⁰

The use of local anaesthetic in early terminations has been found in some studies to be as safe as a general anaesthetic.^{15,17} In the present study only 3.8 per cent of suction evacuations were done under local anaesthetic and no conclusions could be drawn about its safety.

An important finding in the present study was the lower rate of morbidity encountered in women having private sector terminations. This was statistically significant for 'all related morbidity', haemorrhage and operative trauma. A number of factors may explain these differences. Gestation was shorter in the private sector and sterilization was uncommon. The uterine instillation methods, more commonly used in NHS abortions, caused higher rates of infection. Even when these variables and differences in patient characteristics were simultaneously con-

trolled by multiple logistic regression, the NHS remained as a significant independent risk factor for subsequent morbidity, especially at 13 to 16 weeks gestation. It is likely that operators carrying out terminations in private premises are more experienced in the operation, in view of the number of procedures each individual carries out.

Conclusion

Induced abortion in the United Kingdom is a relatively safe operation carrying a low rate of major morbidity. It is possible, however, that morbidity could be reduced in a number of ways. Although late requests for terminations cannot be avoided, it is important for waiting time to be reduced, thus allowing for earlier operations. In expert hands, suction evacuation methods are at least as safe as uterine instillation procedures between 13 and 16 weeks of gestation. Sterilization at termination of pregnancy is a further factor associated with increased morbidity and requires careful justification. Finally, the differences in morbidity between private and NHS sectors, which remain statistically significant even when the data have been controlled for other risk factors, clearly merit close attention.

References

1. World Health Organization. *International classification of diseases*. 8th Revision. Geneva: WHO, 1967.
2. Grimes DA, Cates W. Complications from legally-induced abortion: a review. *Obstet Gynecol Surv* 1979; **34**: 177-191.
3. Cates W, Schulz KR, Grimes DA, *et al*. Dilatation and evacuation procedures and second-trimester abortions. The role of physician skill and hospital setting. *JAMA* 1982; **248**: 559-563.
4. Heisterberg L, Sonne-Holm S, Andersen JT, *et al*. Risk factors in first-trimester abortion. *Acta Obstet Gynecol Scand* 1982; **61**: 357-360.
5. Kay CR, Frank PI. Characteristics of women recruited to a long-term study of the sequelae of induced abortion. *JR Coll Gen Pract* 1981; **31**: 473-477.
6. Frank PI, Kay CR, Lewis PLT, Parish S. Outcome of pregnancy following induced abortion. *Br J Obstet Gynaecol* 1985; **92**: 308-316.
7. Office of Population Censuses and Surveys. *Abortion statistics 1977 England and Wales. Series AB no. 4*. London: HMSO, 1979.
8. Royal College of Obstetricians and Gynaecologists. *Late abortions in England and Wales. Report of a national confidential study*. Alberman E, Dennis KJ (eds). London: RCOG, 1984.
9. Cates W, Schulz KF, Grimes DA, Tyler CW. The effect of delay and method choice on the risk of abortion morbidity. *Fam Plann Perspect* 1977; **9**: 266-273.
10. Tietze C. *Induced abortion. A world review*. Fourth edition. New York: Population Council, 1981.
11. Smith RG, Palmore JA, Steinhoff PG. The potential reduction of medical complications from induced abortion. *Int J Gynaecol Obstet* 1978; **15**: 337-346.
12. Cates W, Grimes DA. Morbidity and mortality of abortion in the United States. In: *Abortion and sterilization*. Hodgson J. (ed). p.162. London: Academic Press, 1981.
13. Savage W, Paterson I. Abortion: methods and sequelae. *Br J Hosp Med* 1982; **28**: 364-384.
14. Cheng MCE, Cheong J, Chew SC, Choo HT. Safety of post-abortion sterilisation compared with an interval sterilisation. *Lancet* 1979; **2**: 682-685.
15. Andolsek L, Cheng M, Hren M, *et al*. The safety of local anesthesia and outpatient treatment: a controlled study of induced abortion by vacuum aspiration. *Stud Fam Plann* 1977; **8**: 118-124.
16. Dalaker K, Sundfor K, Skuland J. Early complications of induced abortion in primigravidae. *Ann Chir Gynaecol* 1981; **70**: 331-336.
17. Grimes DA, Schulz KF, Cates W, Tyler CW. Local versus general anesthesia: which is safer for performing suction curettage abortion? *Am J Obstet Gynecol* 1979; **135**: 1030-1035.

Acknowledgements

We are grateful to the following gynaecologists for their help and constructive criticism in the preparation of this paper: Mr S. L. Barron, Prof M. Elstein, Mr R. H. Martin, and Prof J. R. Newton. We wish to thank the Department of Health and Social Security, who are financing the study, and the general practitioners and gynaecologists who have been responsible for supplying the data which form its basis.

Address for correspondence

Dr P. I. Frank, RCGP Manchester Research Unit, 8 Barlow Moor Road, Manchester M20 0TR.